

CLAIMS

I claim:

- 1 1. A tapping sleeve comprising:
 - 2 first and second sleeve members, the first sleeve member having an outlet
 - 3 aperture; and
 - 4 a gasket having a gasket outlet, the gasket outlet having a pair of tapered surfaces
 - 5 on opposing longitudinal sides of the gasket outlet.
- 1 2. A tapping sleeve according to claim 1, wherein the gasket is a unitary gasket formed by a gasket wall that subtends an arc less than 360 degrees when placed on a pipe in an unstretched, uncompressed position, thereby forming a gap in the gasket wall.
- 1 3. A tapping sleeve according to claim 1, wherein the gasket outlet forms a pair of spaced apart longitudinal surfaces and a pair of spaced apart lateral surfaces in the gasket, each longitudinal surface being joined at one end to one of the lateral surfaces, and each longitudinal surface being adjacent to one of the tapered surfaces.

1 4. A tapping sleeve according to claim 1, wherein:

2 the gasket is formed from a gasket wall having an inside surface and an outside

3 surface;

4 the gasket outlet forms a pair of spaced apart longitudinal surfaces and a pair of

5 spaced apart lateral surfaces in the gasket wall, each longitudinal surface

6 being joined at one end to one of the lateral surfaces, and each longitudinal

7 surface being adjacent to one of the tapered surfaces; and

8 each tapered surface provides a transition between one of the longitudinal surfaces

9 and the inside surface of the gasket.

- 1 5. A tapping sleeve according to claim 1, wherein:
 - 2 the first sleeve member is formed from a first sleeve wall having inner and outer
 - 3 surfaces;
 - 4 the second sleeve member is formed from a second sleeve wall having inner and
 - 5 outer surfaces;
 - 6 an outlet retaining lip is disposed on the inner surface of the first sleeve member
 - 7 surrounding the outlet aperture, the outlet retaining lip having a lip height
 - 8 at a midpoint of the tapping sleeve;
 - 9 the gasket outlet forms a pair of spaced apart longitudinal surfaces and a pair of
 - 10 spaced apart lateral surfaces in the gasket, each longitudinal surface being
 - 11 joined at one end to one of the lateral surfaces, and each longitudinal
 - 12 surface being adjacent to one of the tapered surfaces; and
 - 13 the thickness of the gasket along each longitudinal surface at the midpoint of the
 - 14 tapping sleeve is less than or equal to the lip height of the outlet retaining
 - 15 lip.

1 6. A tapping sleeve according to claim 1, wherein:

2 the first sleeve member is formed from a first sleeve wall having inner and outer
3 surfaces;

4 the second sleeve member is formed from a second sleeve wall having inner and
5 outer surfaces;

6 the gasket outlet forms a pair of spaced apart longitudinal surfaces and a pair of
7 spaced apart lateral surfaces in the gasket, each longitudinal surface being
8 joined at one end to one of the lateral surfaces, and each longitudinal
9 surface being adjacent to one of the tapered surfaces;

10 the tapered surfaces are symmetrically disposed about a gasket plane; and
11 at a midpoint of the tapping sleeve, each tapered surface forms an angle of about 1
12 to 20 degrees with the gasket plane.

1 7. A tapping sleeve according to claim 1, wherein:

2 the gasket includes a gasket wall having a central portion, a stepped portion, an

3 inside surface, and an outside surface;

4 the gasket outlet is formed in the central portion and includes a pair of spaced

5 apart longitudinal surfaces and a pair of spaced apart lateral surfaces in the

6 gasket wall, each longitudinal surface being joined at one end to one of the

7 lateral surfaces, and each longitudinal surface being adjacent to one of the

8 tapered surfaces; and

9 each tapered surface provides a transition between one of the longitudinal surfaces

10 and the inside surface of the gasket.

1 8. A tapping sleeve according to claim 1 further comprising:

2 an outlet retaining lip disposed on an inner surface of the first sleeve member

3 surrounding the outlet aperture;

4 an end retaining lip disposed on the inner surface of the first sleeve member and

5 on an inner surface of the second sleeve member at both ends of the first

6 and second sleeve members;

7 an annular depression formed by the end retaining lips, the outlet retaining lip, and

8 the inner surfaces of the first and second sleeve members; and

9 wherein the gasket is capable of being positioned within the annular depression.

1 9. A tapping sleeve comprising:
2 first and second sleeve members, the first sleeve member having an outlet
3 aperture;
4 an outlet retaining lip disposed around the outlet aperture;
5 a gasket having a gasket wall, the gasket wall having an inside surface, an outside
6 surface, and a gasket outlet, the gasket wall subtending an arc less than
7 360 degrees when placed on a pipe in an un-stretched, uncompressed
8 position, thereby forming a gap in the gasket wall;
9 an armor member attached to the outside surface of the gasket between the gasket
10 outlet and the gap; and
11 wherein the outlet retaining lip is capable of engaging the armor member and, as
12 the first and second sleeve members are connected, is capable of exerting a
13 force on the armor member to stretch the gasket and close the gap.

1 10. A tapping sleeve according to claim 9, wherein the outlet retaining lip includes a flat
2 portion.

1 11. A tapping sleeve according to claim 9, wherein:

2 the tapping sleeve includes a pair of armor members and each armor member is

3 attached to the outside surface of the gasket in one of a pair of relief areas,

4 each relief area disposed between the gasket outlet and the gap;

5 the outlet retaining lip includes a pair of flat portions, each flat portion being

6 located on portions of the outlet retaining lip closest to a mating surface of

7 the first sleeve member;

8 each of the flat portions is capable of engaging an edge of one of the armor

9 members nearest the gasket outlet; and

10 as the first and second sleeve members are connected, the flat portions exert

11 substantially equal forces on opposing sides of the gasket through the

12 armor members, thereby stretching the gasket around a pipe and closing

13 the gap.

- 1 14. A tapping sleeve according to claim 10 further comprising:
 - 2 an end retaining lip disposed on inner surfaces of the first and second sleeve
 - 3 members at both ends of the first and second sleeve members;
 - 4 an annular depression formed by the end retaining lips, the outlet retaining lip, and
 - 5 the inner surfaces of the first and second sleeve members; and
 - 6 wherein the gasket is capable of being positioned within the annular depression.

- 1 15. A tapping sleeve according to claim 10, wherein:
 - 2 the gasket outlet further includes a pair of tapered surfaces on opposing
 - 3 longitudinal sides of the gasket outlet; and
 - 4 the tapered surfaces prevent excessive flow of the gasket into the outlet aperture
 - 5 as the first and second sleeve members are connected around the gasket.

1 16. A tapping sleeve according to claim 10, wherein:

2 the gasket outlet forms a pair of spaced apart longitudinal surfaces and a pair of
3 spaced apart lateral surfaces in the gasket wall, each longitudinal surface
4 being joined at one end to one of the lateral surfaces, and each longitudinal
5 surface being adjacent to one of a pair of tapered surfaces;
6 each tapered surface provides a transition between one of the longitudinal surfaces
7 and the inside surface of the gasket; and
8 the tapered surfaces prevent excessive flow of the gasket into the outlet aperture
9 as the first and second sleeve members are connected around the gasket.

1 17. A tapping sleeve according to claim 10, wherein:

2 the gasket outlet forms a pair of spaced apart longitudinal surfaces and a pair of
3 spaced apart lateral surfaces in the gasket wall, each longitudinal surface
4 being joined at one end to one of the lateral surfaces, and each longitudinal
5 surface being adjacent to one of a pair of tapered surfaces;
6 the tapered surfaces are symmetrically disposed about a gasket plane; and
7 at a midpoint of the tapping sleeve, each tapered surface forms an angle of about 1
8 to 20 degrees with the gasket plane.

1 18. A tapping sleeve according to claim 10, wherein:

2 the first sleeve member is formed from a first sleeve wall having inner and outer

3 surfaces;

4 the second sleeve member is formed from a second sleeve wall having inner and

5 outer surfaces;

6 the outlet retaining lip has a lip height at a midpoint of the tapping sleeve;

7 the gasket outlet forms a pair of spaced apart longitudinal surfaces and a pair of

8 spaced apart lateral surfaces in the gasket wall, each longitudinal surface

9 being joined at one end to one of the lateral surfaces, and each longitudinal

10 surface being adjacent to one of a pair of tapered surfaces; and

11 the thickness of the gasket along each longitudinal surface at the midpoint of the

12 tapping sleeve is less than or equal to the lip height of the outlet retaining

13 lip.

1 19. A tapping sleeve according to claim 10, wherein:

2 the gasket wall includes a central portion and a stepped portion;

3 the gasket outlet is formed in the central portion and includes a pair of spaced

4 apart longitudinal surfaces and a pair of spaced apart lateral surfaces in the

5 gasket wall, each longitudinal surface being joined at one end to one of the

6 lateral surfaces, and each longitudinal surface being adjacent to one of a

7 pair of tapered surfaces;

8 each tapered surface provides a transition between one of the longitudinal surfaces

9 and the inside surface of the gasket; and

10 the tapered surfaces prevent excessive flow of the gasket into the outlet aperture

11 as the first and second sleeve members are connected around the gasket.

1 22. A tapping sleeve according to claim 20, wherein:

2 the gasket wall includes a central portion and a stepped portion; and

3 the central portion of the gasket is positionable within the annular depression and

4 the stepped portion is positionable adjacent a radially inward surface of the

5 end retaining lip.

1 23. A tapping sleeve according to claim 20, wherein:

2 the gasket is placeable around a pipe such that the inside surface of the gasket is

3 adjacent the pipe and the gasket outlet is aligned with an area of the pipe

4 to be tapped; and

5 the first and second sleeve members are placeable around the gasket and the pipe

6 such that the inner surfaces of the first and second sleeve members are

7 adjacent the outside surface of the gasket.

1 24. A tapping sleeve according to claim 20, wherein:

2 the gasket outlet forms a pair of spaced apart longitudinal surfaces and a pair of
3 spaced apart lateral surfaces in the gasket wall, each longitudinal surface
4 being joined at one end to one of the lateral surfaces, and each longitudinal
5 surface being adjacent to one of a pair of tapered surfaces;
6 each tapered surface provides a transition between one of the longitudinal surfaces
7 and the inside surface of the gasket; and
8 the tapered surfaces prevent excessive flow of the gasket into the outlet aperture
9 as the first and second sleeve members are connected around the gasket.

1 25. A tapping sleeve according to claim 20, wherein:

2 the outlet retaining lip has a lip height at a midpoint of the tapping sleeve;
3 the gasket outlet forms a pair of spaced apart longitudinal surfaces and a pair of
4 spaced apart lateral surfaces in the gasket wall, each longitudinal surface
5 being joined at one end to one of the lateral surfaces, and each longitudinal
6 surface being adjacent to one of a pair of tapered surfaces; and
7 the thickness of the gasket along each longitudinal surface at the midpoint of the
8 tapping sleeve is less than or equal to the lip height of the outlet retaining
9 lip.

1 26. A tapping sleeve according to claim 20, wherein:

2 the gasket outlet forms a pair of spaced apart longitudinal surfaces and a pair of

3 spaced apart lateral surfaces in the gasket wall, each longitudinal surface

4 being joined at one end to one of the lateral surfaces, and each longitudinal

5 surface being adjacent to one of a pair of tapered surfaces;

6 the tapered surfaces are symmetrically disposed about a gasket plane; and

7 at a midpoint of the tapping sleeve, each tapered surface forms an angle of about 1

8 to 20 degrees with the gasket plane.

- 1 27. A tapping sleeve according to claim 20, wherein:
 - 2 the gasket wall includes a central portion and a stepped portion;
 - 3 the central portion of the gasket is positionable within the annular depression and
 - 4 the stepped portion is positionable adjacent a radially inward surface of the
 - 5 end retaining lip;
 - 6 the gasket outlet is formed in the central portion and includes a pair of spaced
 - 7 apart longitudinal surfaces and a pair of spaced apart lateral surfaces in the
 - 8 gasket wall, each longitudinal surface being joined at one end to one of the
 - 9 lateral surfaces, and each longitudinal surface being adjacent to one of a
 - 10 pair of tapered surfaces;
 - 11 each tapered surface provides a transition between one of the longitudinal surfaces
 - 12 and the inside surface of the gasket; and
 - 13 the tapered surfaces prevent excessive flow of the gasket into the outlet aperture
 - 14 as the first and second sleeve members are connected around the gasket.

1 28. A tapping sleeve comprising:

2 a first sleeve member having a mainline portion, a branch portion, and a first
3 plurality of lugs integrally attached to the mainline portion, the mainline
4 portion being formed from a first sleeve wall having an inner surface and
5 an outer surface and terminating in a pair of first mating surfaces, the
6 branch portion including a cylindrical passage passing through the first
7 wall and forming an outlet aperture;

8 a second sleeve member having a second plurality of lugs; the second sleeve
9 member being formed from a second sleeve wall having an inner surface
10 and an outer surface and terminating in a pair of second mating surfaces;
11 an outlet retaining lip disposed on the inner surface of the first sleeve wall
12 surrounding the outlet aperture, the outlet retaining lip having a pair of flat
13 portions disposed on opposite sides of the outlet aperture nearest the first
14 mating surfaces;

15 an end retaining lip disposed on the inner surfaces of the first and second sleeve
16 members at both ends of the first and second sleeve members;

17 a unitary gasket having a central portion and a stepped portion formed from a
18 gasket wall, the gasket wall having an inside surface and an outside
19 surface and subtending an arc that is less than 360 degrees when placed on
20 a pipe in an un-stretched, uncompressed position, thereby forming a gap
21 between a first gap surface and a second gap surface of the gasket wall;

22 a gasket outlet formed in the central portion of the gasket, the gasket outlet
23 forming a pair of spaced apart longitudinal surfaces and a pair of spaced
24 apart lateral surfaces in the gasket wall, each longitudinal surface being
25 joined at one end to one of the lateral surfaces;
26 a tapered surface formed in the gasket wall adjacent each longitudinal surface, the
27 tapered surfaces providing a transition between the longitudinal surfaces
28 and the inside surface of the gasket;
29 a pair of armor members attached to the outside surface of the gasket between the
30 longitudinal surfaces of the gasket outlet and the gap in the gasket;
31 wherein the gasket is placeable around the pipe such that the inside surface of the
32 gasket is adjacent the pipe and the gasket outlet is aligned with an area of
33 the pipe to be tapped;
34 wherein the first and second sleeve members are placeable around the gasket and
35 the pipe such that the inner surfaces of the first and second sleeve
36 members are adjacent the outside surface of the central portion of the
37 gasket,
38 wherein the first and second sleeve members are connectable by placing fasteners
39 through the first and second plurality of lugs and tightening the fasteners
40 until the first mating surfaces of the first sleeve member engage the second
41 mating surfaces of the second sleeve member;

42 wherein each of the flat portions of the outlet retaining lip is capable of engaging
43 one of the armor members and, as the first and second sleeve members are
44 connected, is capable of exerting a force on the armor member such that
45 the gasket is stretched around the pipe, thereby closing the gap between
46 the first and second gap surfaces; and
47 wherein the tapered surface of the gasket prevents excessive flow of the gasket
48 underneath the outlet retaining lip as the first and second sleeve members
49 are connected, thereby preventing blockage of the outlet aperture by the
50 gasket.

1 29. A tapping sleeve according to claim 28, wherein:
2 the outlet retaining lip has a lip height at a midpoint of the tapping sleeve; and
3 the thickness of the gasket along each longitudinal surface at the midpoint of the
4 tapping sleeve is less than or equal to the lip height of the outlet retaining
5 lip.

1 30. A tapping sleeve according to claim 28, wherein
2 the tapered surfaces are symmetrically disposed about a gasket plane; and
3 at a midpoint of the tapping sleeve, each tapered surface forms an angle of about 1
4 to 20 degrees with the gasket plane.